Municipalities Have A Key Role in Protecting Groundwater Resources

By Paul Susca

Municipal officials as well as private citizens in New Hampshire seem to be increasingly concerned about the availability and quality of groundwater in their communities. Ever since the publication of sand-and-gravel aquifer maps in the mid 1970s, local planning and conservation officials have taken a keen interest in identifying, understanding and protecting their groundwater resources for present and future use. At that time, the concern was mainly to prevent contamination of groundwater, since there had been a number of high-profile contamination incidents involving leaking underground storage tanks and industrial sources. Since the publication of the early aquifer maps, the Department of Environmental Services (DES) and U.S. Geological Survey (USGS) have published an updated and enhanced set of aquifer maps and a series of educational and guidance documents, which have further fueled local interest in protecting groundwater. A number of recent developments have heightened this concern about groundwater and have caused the concern to shift from preventing contamination to ensuring groundwater availability.

Citizens and local officials *should be* concerned about groundwater; it is an ecologically and economically vital resource in New Hampshire. Approximately 60 percent of the population depends on groundwater as its primary source of water and the other 40 percent rely on surface water, which comes in part from groundwater. Groundwater is also a safe and reliable source for the 40 percent of homes that are not served by community water systems. In addition, groundwater plays a key role in maintaining the ecological health of rivers, streams, lakes, ponds and wetlands. Consequently, groundwater is important for the people who depend on these surface waters for recreation, for their livelihoods and for drinking water. An estimated 40 percent of the water that flows in our rivers and streams comes from groundwater; it's what keeps our rivers flowing during dry periods.

Why the growing concern about groundwater availability? The drought of 2001-2002 played no small role in raising public awareness about our dependence on groundwater. Nothing captures the attention like having a private well go dry or having to live with water use restrictions for the first time. Rightly or wrongly, the drought caused many New Hampshire residents to look for someone to blame when they started feeling the effects of the drought. Who or what did they find? Again, rightly or wrongly, they blamed the new subdivision up the hill with acres and acres of sprinklered lawns, or the large groundwater withdrawal a half mile away. Those who began to educate themselves about the issue also blamed the sprawling acres of pavement around them that might be preventing rain from naturally replenishing the groundwater. And entire towns were up in arms about proposed new groundwater withdrawals, whether for public water systems or private uses such as golf courses or water bottling plants.

Adding to the recent concerns about groundwater availability, or quantity, are new worries about groundwater quality. Reports from the New Hampshire Department of Environmental Services (DES) and the United States Geological Survey (USGS) pointed out the high levels of naturally-occurring radon and arsenic in groundwater supplying both private and public wells in some areas. As of 2002, the gasoline additive methyl tertiary-butyl ether (MtBE) was detected in 15 percent of public water supplies tested statewide (33 percent of public wells in Strafford County and 23 percent in Rockingham County). In addition, a

preliminary analysis of more recent data from a joint DES/USGS study of public water systems in Rockingham County (using lower detection limits) found MtBE in 41 percent of those wells! DES estimates that 40,000 private wells in New Hampshire contain some level of MtBE. Public water supply wells with MtBE levels above the state health-based limit are being treated, but neither state nor federal law requires treatment of private wells (please see sidebar).

The Department of Environmental Services has a number of programs to prevent groundwater contamination, ensure and oversee the cleanup of contamination and ensure that large groundwater withdrawals do not have an adverse impact on other water users or on the environment. Among other things, these programs deal with underground storage tanks, hazardous waste handling, solid waste disposal and septic systems. However, municipal governments have a critical role in protecting groundwater resources as well. As important as the municipal role is, however, it is not unlimited. Because groundwater, like all water resources, transcends municipal boundaries, certain aspects of its regulation are reserved by the state. (Please see RSA 481:1 and 485-C:1.)

The Local Role in Protecting Quality

The importance of local actions to prevent groundwater contamination follows from two facts: there are too many *potential* sources of contamination for DES to directly oversee and New Hampshire has a long tradition of local control over land use. Statewide, DES's databases include more than 4,000 hazardous waste generators, approximately 2,400 underground storage tank sites (some with up to 10 tanks) and 1,000 above-ground storage tank sites. In addition to these sites, which are regulated directly by DES, the Department has identified approximately 2,000 additional po-

DES Urges Municipalities to Encourage Private Well Testing

Approximately 35 to 40 percent of New Hampshire residents rely on private wells for their residential water supply. In many towns, private wells are the primary, if not sole, source of domestic water supply. But, while the state does regulate well drillers and pump installers, it does not regulate the quality of water obtained from private wells. If water quality standards for public water systems were applied to private wells, DES estimates that 95 percent would exceed the proposed federal maximum contaminant level (MCL) of 300 pCi/L for radon! And about 13 percent would exceed the federal MCL of 10 ug/L for arsenic. Both of these contaminants occur naturally, but that does not make them any less of a health risk.

In contrast, human-caused contaminants are much less prevalent in New Hampshire. For example, DES estimates that volatile organic compounds, such as from petroleum products and cleaning solvents, contaminate approximately one percent of private wells above the federal limit. Recent data suggest that approximately 20 percent of private wells in New Hampshire have some level of the gasoline additive MtBE, the vast majority of them at very low levels.

Homeowners are responsible for testing their own private well water and obtaining appropriate treatment, if needed. In 2000, DES initiated an effort to make homeowners aware of the need for private well testing, and issued an expanded list of parameters to test for. Since then, New Hampshire residents have learned about private well testing through DES's radio public service announcements, fliers and posters in town offices, and hundreds of home inspectors and real estate agents have attended our workshops covering private well testing.

Municipal officials can help ensure private well users have the knowledge they need to make informed decisions about their well water in two ways. The first and most important is public education. If DES's private well testing displays are no longer prominent in your community, replacements are available at 603/271-3303. Second, municipalities can provide homebuyers with additional opportunities to find out about well water quality by requiring testing of a minimum number of test wells when subdivisions are approved. If a municipality is going to require testing, it should specify testing for the full range of parameters recommended by DES. At least one municipality already goes beyond this recommendation; the Town of Salem requires that water from private wells be treated to meet federal standards before issuing a certificate of occupancy.

tential sources of groundwater contamination, *just in the vicinity of public water supply wells*. Hundreds of water suppliers have voluntarily taken on the task of providing educational materials to these potential contamination sources (PCSs) to educate them about DES's groundwater protection best management practices (BMPs) and dozens of water suppliers conduct periodic visits at PCS facilities to ensure that they comply with the BMPs. A few towns even conduct these BMP visits to ensure town-wide protection of groundwater, but the vast majority of municipalities have no such programs.

Another important non-regulatory tool, which all municipalities should adopt even if they do nothing else to protect groundwater, is public education. People need to know what to do and what not to do to prevent groundwater contamination—simple everyday practices such as careful handling of gasoline when fueling the lawn mower and keeping toxic chemicals out of the septic system. DES has user-friendly flyers that can be used for this purpose and there are myriad other groundwater education materials for various ages, levels of education and budgets. DES can also provide examples of materials that cover groundwater basics (see sidebar), make people aware of local groundwater resources (such as important aquifers) and promote water conservation.

New Hampshire municipalities can also look to several regulatory options relying on their existing statutory authority. Zoning and land use authority can be employed as an effective way to restrict the location of risky land uses such as junkyards, road salt storage, gas stations and sewage or septage lagoons, and to establish design or performance standards for PCSs that are allowed. Adopting the *Model Groundwater Protection Ordinance*, developed by DES and the Office of State Planning (now the Office of Energy and Planning), is an excellent way to accomplish this. For PCSs that already exist, the local land use regulatory authority is limited to changes in use or certain expansions, but municipalities can employ their public health regulatory authority to require compliance with appropriate designs and practices. DES's *Model Health Ordinance to Implement a Wellhead or Groundwater Protection Program* details this approach.

New Hampshire's Groundwater Protection Act (RSA 485-C) provides a third option involving both state and local involvement. Through the groundwater reclassification process, local entities, such as municipalities or water suppliers, apply to DES to upgrade the classification of local groundwater resources such as wellhead protection areas, aquifers or even the entire town. The local entity prepares an inventory of potential contamination sources and conducts BMP visits and obtains the authority to en-

Groundwater Basics

Water in the saturated zone (below the water table) under the surface of the earth is called **groundwater**. It starts as rain and snowmelt, which then seeps down from the surface and saturates materials such as soil, sand, gravel, and rock below the water table. Like surface water (rivers, lakes, etc.) groundwater moves, although more slowly. As with surface water, the movement of groundwater is driven by gravity, which creates hydraulic head or water pressure. Groundwater moves from areas of high head to areas of low head. Pumping wells create areas of low hydraulic head, causing groundwater to move from the surrounding area toward the well. In general, the greater the amount of water being pumped from a well, the greater the area of land that contributes water to the well. The **wellhead protection area** is an approximation of the contributing area.

An **aquifer** is a layer of material (soil, sand, gravel, rock, etc.) that can be used as a water supply source. The ability of the material to supply water depends on the amount of water in that layer and the ability of the material to allow water to flow to a well.

The two broad categories of aquifers are **bedrock aquifers** and **overburden aquifers**. Bedrock aquifers supply water to wells through fractures, or cracks, in the rock. In New Hampshire, the ability of bedrock wells to supply water varies greatly. A bedrock well for a single-family home can be successfully drilled almost anywhere in the state. However, siting a bedrock well for a large public water system may take a great deal of geologic investigation beforehand to find a spot with major water-bearing fractures in the bedrock. Overburden is the soil, subsoil, sand, gravel and other unconsolidated material that lies on top of bedrock. Most of the highly productive wells in New Hampshire are overburden wells, drawing on thick deposits of sand and gravel that cover large areas.

Groundwater and surface water are interconnected. Depending on the site, the time of year, the weather, and nearby withdrawals and discharges, groundwater may discharge to surface water or vice-versa.

force state BMP rules. In wellhead protection areas reclassified to the highest level, DES prohibits six high-risk types of land uses and requires existing non-conforming uses to install groundwater monitoring wells. A half-dozen municipalities have employed this approach in their groundwater protection programs and several more are in the process.

While some municipal officials may be unfamiliar with the groundwater quality-oriented approaches described above, none of them is new. DES published guidance documents four to eight years ago to help local officials implement these approaches. More recently, DES has turned its attention to the groundwater availability (quantity) issue, in terms of both regulatory and outreach initiatives. The first of these is the Large Groundwater Withdrawal Permitting Program, established in 1998. The enabling legislation required new large (57,600 gallons per day or more) groundwater withdrawals to first obtain a permit from DES. Before issuing a permit, DES ensures that the proposed withdrawal will not have an adverse impact on the environment or on existing water users, including private well users.

The second is DES's water efficiency outreach program, the core of which is a set of four case studies and 17 fact sheets focusing on various water efficiency practices and water use sectors. Closely related to this program, DES published a model bylaw to enable municipal water systems to enact water use restrictions in the event of water supply emergencies such as droughts. DES also developed *Managing Stormwater as a Valuable Resource* to call attention to the importance of proper stormwater management in preserving—rather than disrupting—the natural process of groundwater replenishment by infiltration of stormwater. The latter is an issue of growing importance in highly urbanized areas that overlie aquifers or sensitive watersheds.

DES's most recent water efficiency effort is the development of rules that require certain water users to implement well-established approaches to minimize wasteful water uses. The draft rules, currently being considered by an advisory committee, will apply to all water users that need permits for new water withdrawals under DES's existing programs (*e.g.*, large groundwater withdrawals, new community water supply wells and surface water intakes requiring wetland or 401 water quality certification permits).

The Local Role in Protecting Groundwater Availability

Even in light of DES's new programs, the role of municipalities in protecting groundwater availability—on both the input and withdrawal ends—is more important than ever. As the principal regulators of land use, municipalities have a responsibility to ensure that groundwater resources will continue to be replenished after a site has been developed. And, because only the largest water withdrawals are covered by DES's regulatory programs, local governments should follow up their local water resources planning efforts with concrete steps to manage water demand where appropriate.

New Hampshire's groundwater picture is not what it used to be. DES and local officials have filled in many of the gaps that previously existed in terms of preventing groundwater contamination, but much more can be done on the local level.

Local planning boards traditionally have a role in regulating stormwater management through zoning standards, site plan review, subdivision review and specific stormwater management standards. Municipal officials concerned about the future availability of groundwater—and surface water—should review DES's *Managing Stormwater as a Valuable Resource* with a view toward ensuring that local stormwater management standards and policies are not making matters worse by short-circuiting the water cycle.

The municipal role in managing water demand does not have a long tradition in New Hampshire, and there has been some confusion about the limits of municipal authority in this area. However, there is no doubt that municipalities can implement public education programs to encourage wise water use. The central messages of these programs are to make the public aware of the limits of their water resources, how much water they use, how much water is needed for uses such as lawn watering and practical ways to avoid water waste. Because lawn watering represents such an enormous portion of water use in many communities—particularly at times when the supply is most severely stressed—water efficiency education programs typically focus a great deal of their resources on efficient lawn watering as well as alternatives to water-hungry lawns (please see sidebar).

Where education by itself is not enough to manage water demand, municipalities might consider landscaping standards and sprinkler system design standards. The key provisions of landscaping standards designed to foster water use efficiency would be minimum topsoil depths for new lawns (lawns with sufficient topsoil need little or no irrigation) and possibly the selection of drought-tolerant grasses or

limits on the size of sprinklered areas. According to NHMA General Counsel Maura Carroll, site plan review design standards and historic district design standards are two likely places to include these provisions. Ms. Carroll also notes that both landscaping standards and sprinkler design standards could probably be addressed through local building codes and/or property maintenance codes adopted pursuant to RSA 674:51 (as long as they are not inconsistent with the state building code). DES can provide examples of specific design standards that have been adopted by municipalities in other states. For example, lawn sprinkler systems should include moisture sensing devices to prevent sprinklers from going on when the lawn does not need the water.

Even in the absence of local regulatory initiatives to manage water demand, there is a role for municipalities in DES's large groundwater withdrawal permitting process. Potentially affected municipalities have an opportunity to request a public hearing on a permit application. Such a hearing, and the public comment period that follows, can help to ensure that DES has all of the available information about water users and other water resources that might be affected by the withdrawal. In addition to assisting DES, the hearing and comment period help the public because DES must respond in writing to all comments provided at the hearing that are contrary to any decision DES later makes on the permit application.

New Hampshire's groundwater picture is not what it used to be. DES and local officials have filled in many of the gaps that previously existed in terms of preventing groundwater contamination, but much more can be done on the local level. New Hampshire and other states in the region are just beginning to face some difficult choices regarding the use and regulation of water withdrawals. Whatever path the state takes, there is sure to be an important role for local governments. DES's Drinking Water Source Protection Program aims to provide the technical support and guidance, as well as financial assistance, local governments need to meet this challenge. We look forward to hearing from local officials regarding what form that guidance might take in the coming years. ■

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Alternatives to Traditional Water-Thirsty Lawns

The average American family sprays a whopping 40 percent of their water on their landscape, very little of it actually being utilized by the plants. Unfortunately, the unused portion is not necessarily recycled back to their water source. Most of the excess is lost to evaporation or runoff, and what does soak into the ground may not find its way back to their private well or community system's source. There are a number of ways homeowners can avoid this waste.

Xeriscaping is a comprehensive water-wise approach to landscaping that involves little or no watering. It incorporates planning and design with efficient irrigation systems, use of mulch, soil preparation, reduced turf areas, water-efficient or native plant material and appropriate maintenance.

A simple way to reduce lawn watering is to choose turf grasses that don't need supplemental water, such as hard fescue and Chewings fescue. The water needs of a lawn can also be minimized by properly preparing or amending the soil with adequate organic matter.

With or without these changes, much can be done to make lawn watering practices more efficient. Watering frequency should be based on soil moisture, weekly precipitation and plant/turf conditions. Typically, established landscape plants and turf grass require an inch of water per week. Lawn watering only needs to make up the difference between actual rainfall and that crucial one inch. Finally, a watering system should be designed and checked to make sure that there are no leaks and that it only irrigates the area that needs water.

Adapted from DES fact sheet WD-WSEB-26-4, "Fundamentals of Xeriscaping and Water-Wise Landscaping."